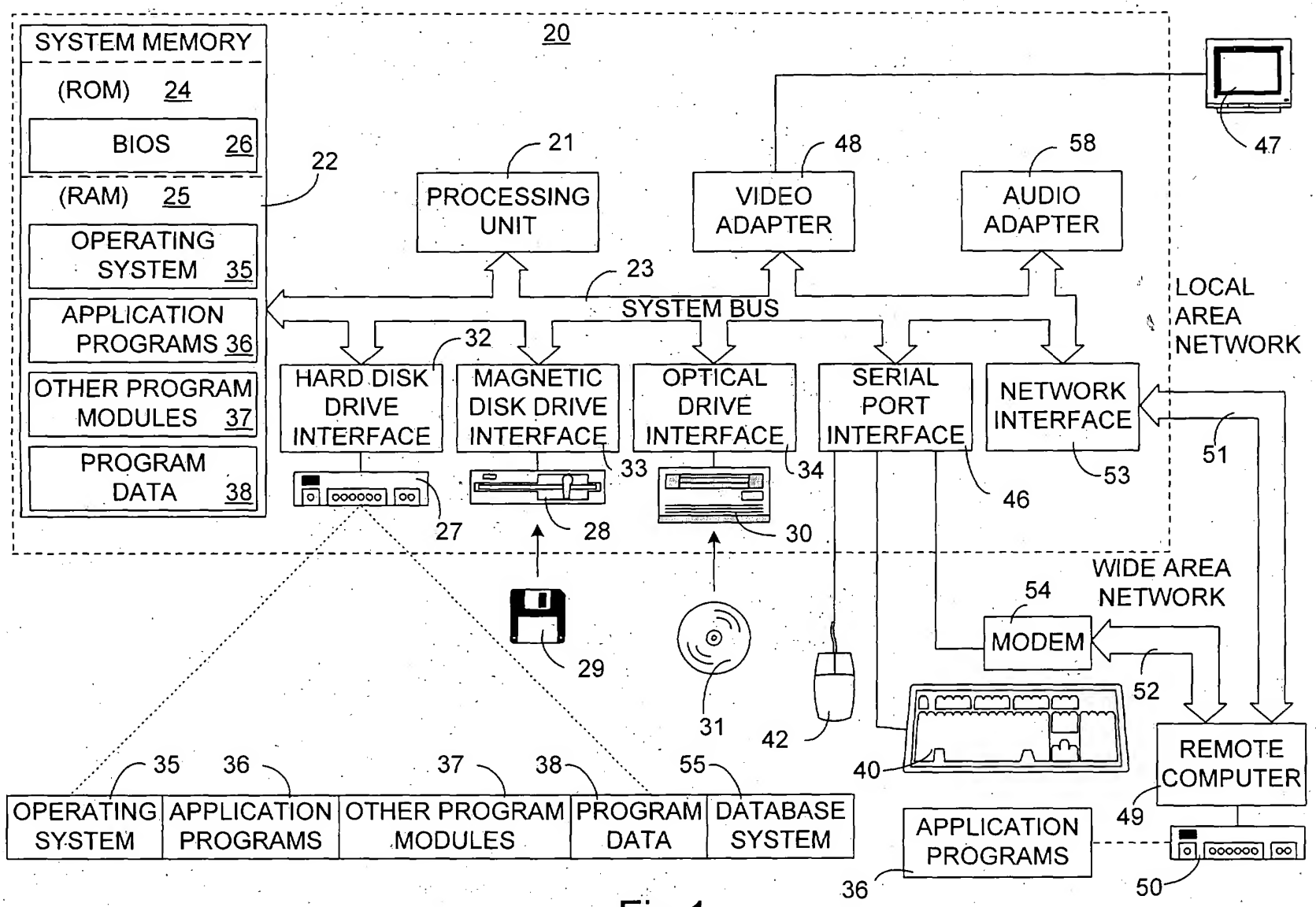
20
SYSTEM MEMORY
(ROM) 24
BIOS 26
(RAM) 25
OPERATING SYSTEM 35
APPLICATION PROGRAMS 36
OTHER PROGRAM MODULES 37
PROGRAM DATA 38
22
PROCESSING UNIT
21
VIDEO ADAPTER
48
AUDIO ADAPTER
58
47
23
SYSTEM BUS
LOCAL AREA NETWORK
HARD DISK DRIVE INTERFACE
32
MAGNETIC DISK DRIVE INTERFACE
33
OPTICAL DRIVE INTERFACE
34
SERIAL PORT INTERFACE
46
NETWORK INTERFACE
53
51
27
28
30
29
31
42
WIDE AREA NETWORK
54
MODEM
52
40
REMOTE COMPUTER
49
50
APPLICATION PROGRAMS
36
OPERATING SYSTEM
35
APPLICATION PROGRAMS
36
OTHER PROGRAM MODULES
37
PROGRAM DATA
38
DATABASE SYSTEM
55

Fig.1

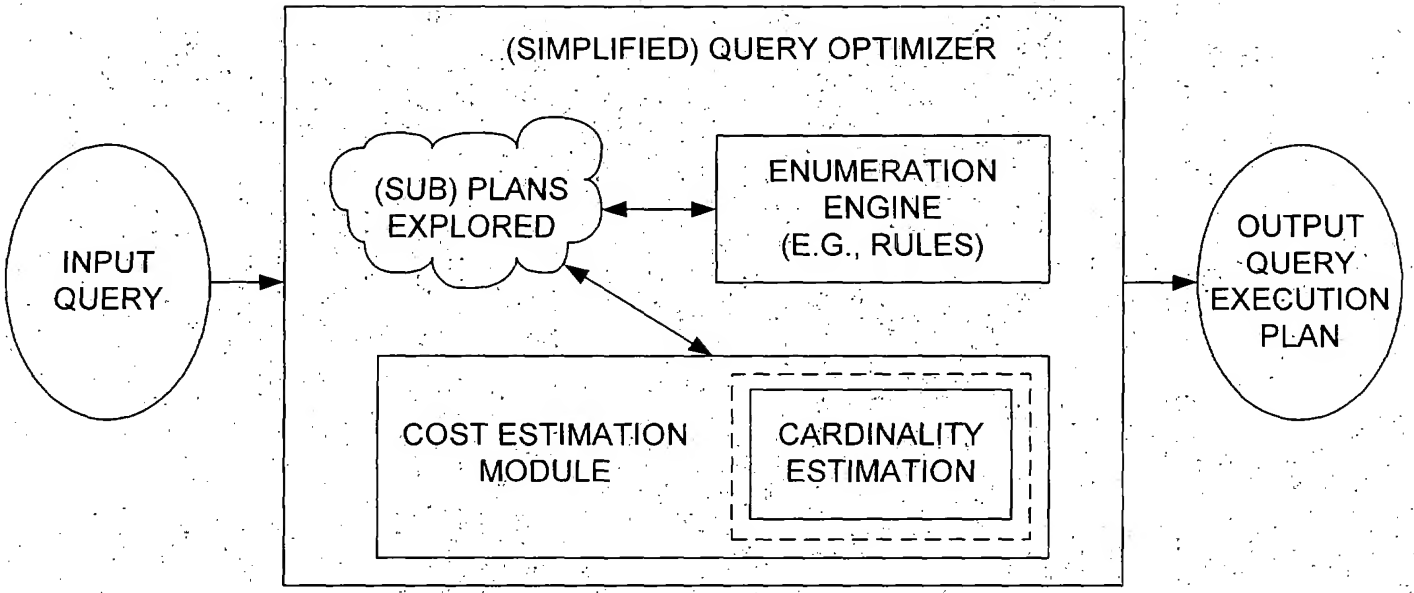
(SIMPLIFIED) QUERY OPTIMIZER
INPUT QUERY
(SUB) PLANS EXPLORED
ENUMERATION ENGINE (E.G., RULES)
COST ESTIMATION MODULE
CARDINALITY ESTIMATION
OUTPUT QUERY EXECUTION PLAN

Fig.2

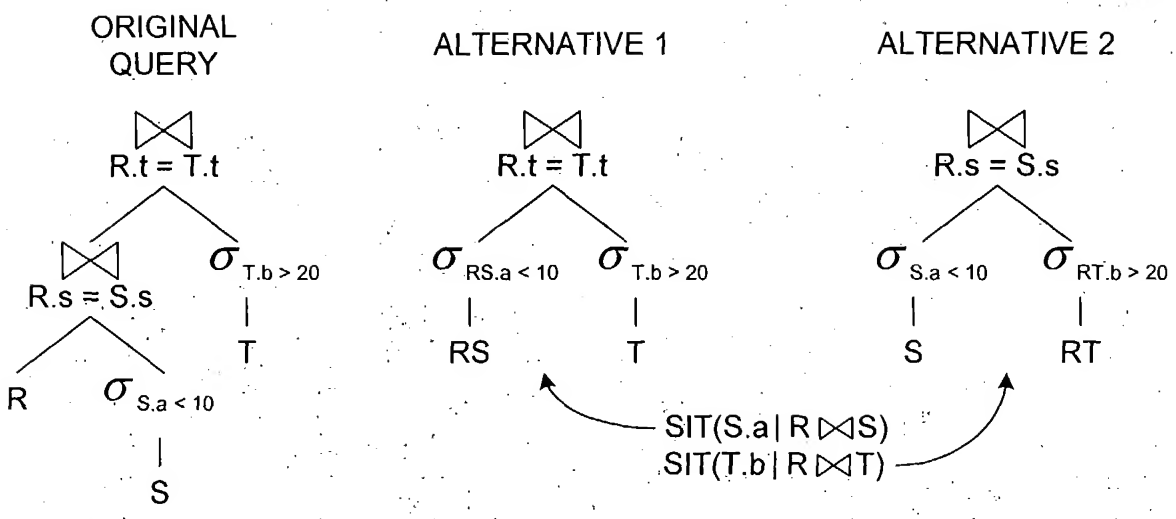
ORIGINAL QUERY
ALTERNATIVE 1
ALTERNATIVE 2
R.t = T.t
R.s = S.s
σ T.b > 20
T
R
σ S.a < 10
S
R.t = T.t
σ RS.a < 10
σ T.b > 20
RS
T
R.s = S.s
σ S.a < 10
σ RT.b > 20
S
RT
SIT(S.a | R ⋈ S)
SIT(T.b | R ⋈ T)

Fig.3

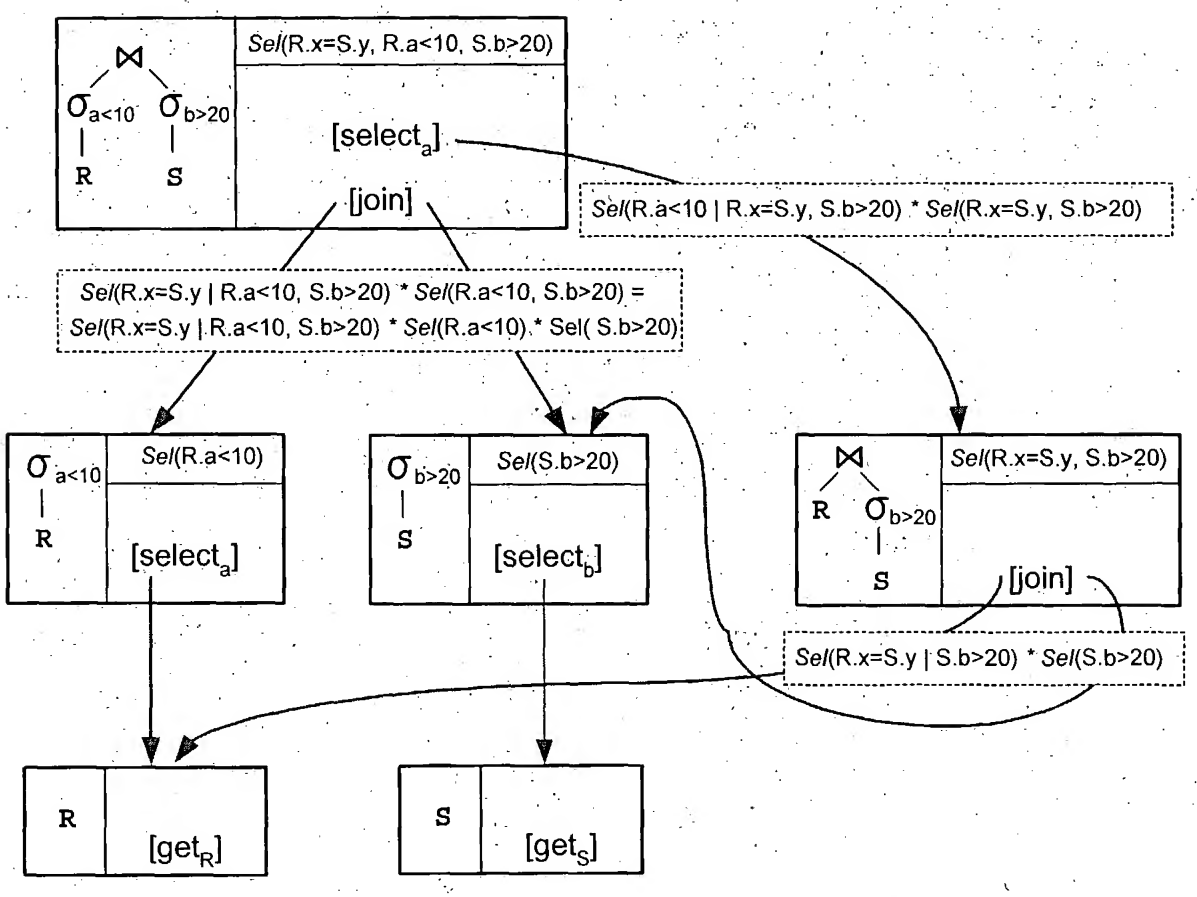
Sel(R.x=S.y, R.a<10, S.b>20)
σa<10
σb>20
R
S
[selecta]
[join]
Sel(R.a<10 | R.x=S.y, S.b>20) * Sel(R.x=S.y, S.b>20)
Sel(R.x=S.y | R.a<10, S.b>20) * Sel(R.a<10, S.b>20) =
Sel(R.x=S.y | R.a<10, S.b>20) * Sel(R.a<10) * Sel(S.b>20)
σa<10
R
Sel(R.a<10)
[selecta]
σb>20
S
Sel(S.b>20)
[selectb]
Sel(R.x=S.y, S.b>20)
R
σb>20
S
[join]
Sel(R.x=S.y | S.b>20) * Sel(S.b>20)
R
[getR]
S
[getS]

Fig.5

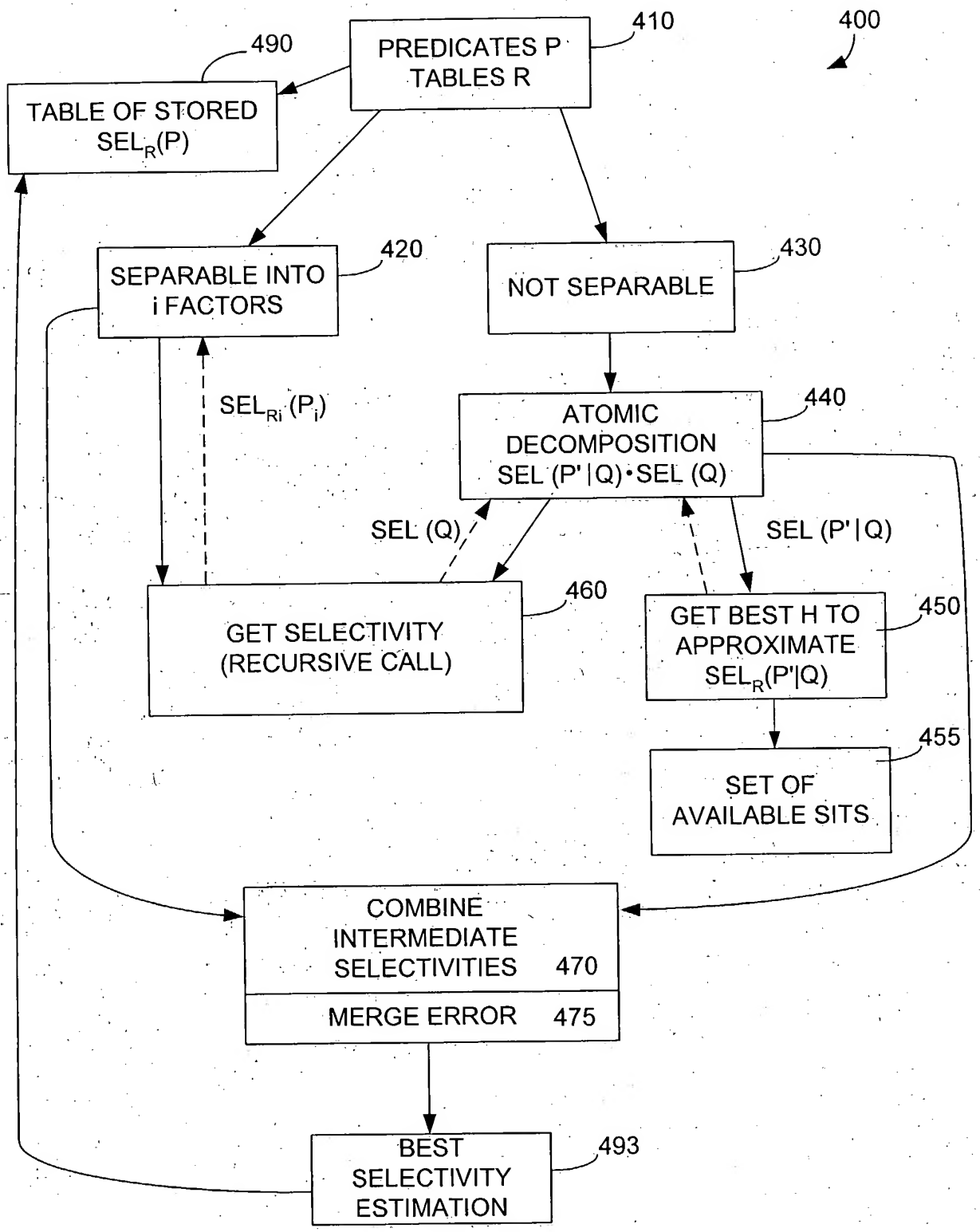
400
PREDICATES P
TABLES R
410
490
TABLE OF STORED
SEL_R(P)
SEPARABLE INTO
i FACTORS
420
NOT SEPARABLE
430
SEL_Ri (P_i)
ATOMIC
DECOMPOSITION
SEL (P'|Q)·SEL (Q)
440
SEL (Q)
SEL (P'|Q)
GET SELECTIVITY
(RECURSIVE CALL)
460
GET BEST H TO
APPROXIMATE
SEL_R(P'|Q)
450
SET OF
AVAILABLE SITS
455
COMBINE
INTERMEDIATE
SELECTIVITIES
470
MERGE ERROR
475
BEST
SELECTIVITY
ESTIMATION
493

Fig.4

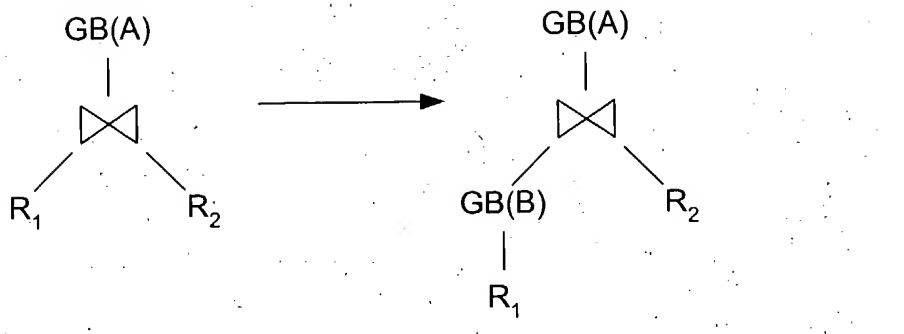
GB(A)
R1
R2
GB(A)
GB(B)
R2
R1
B = A U {JOIN ATTRIBUTES ON R1}

Fig.6

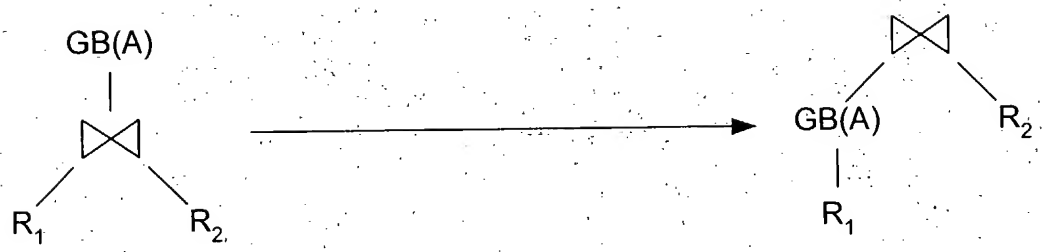
GB(A)
R1
R2
GB(A)
R2
R1

Fig.7